**BEFORE THE PUBLIC UTILITIES COMMISSION**
**OF THE**
**STATE OF CALIFORNIA**

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# OPENING COMMENTS OF TRANSWEST EXPRESS LLC ON ENERGY DIVISION STAFF PROPOSAL ON THE RPS CALCULATOR

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# OPENING COMMENTS OF TRANSWEST EXPRESS LLC ON ENERGY DIVISION STAFF PROPOSAL ON THE RPS CALCULATOR

Pursuant to the October 10, 2014, California Public Utilities Commission ("Commission") Administrative Law Judge's Ruling (1) Issuing an Energy Division Proposal on the Renewables Portfolio Standards ("RPS") Calculator ("Proposal"), (2) Entering the Proposal into the Record, and (3) Setting a Comment and Workshop Schedule, TransWest Express LLC ("TransWest") respectfully submits the following initial comments.

TransWest urges prompt consideration of appropriate revisions to the RPS Calculator as well as closer coordination between the Commission's Long Term Procurement Planning ("LTPP") proceeding (R.12-03-014) and the California Independent System Operator Corporation's ("CAISO") Transmission Planning Process ("TPP") to facilitate the ability of entities subject to the RPS standard to timely and cost-effectively meet their procurement targets.

## I. BACKGROUND ON TRANSWEST AND THE TWE PROJECT

TransWest is an independent transmission developer focused on permitting and developing the TransWest Express Transmission Project ("TWE Project"). The TWE Project is a 725-mile, 600 kilovolt ("kV") direct-current ("DC") transmission system that when completed will be capable of providing California with access to 12,000 gigawatt hours ("GWh") per year of Wyoming's high-quality and low-cost wind energy. Wyoming has the best on-shore wind resources in the nation, and the TWE Project will provide a critical link between these renewable resources and California's power markets. The TWE Project's DC technology provides for a cost effective and efficient transfer of renewable power from Wyoming to the Desert Southwest.

The TWE Project's southern terminal will be interconnected to existing 500 kV substations located near the Nevada-California border, which are owned and operated by the California Independent System Operator Corporation ("CAISO"), CAISO Participating Transmission Owners, the Los Angeles Department of Water & Power, and others. There is also a third terminal being permitted near Delta, Utah which would allow the TWE Project to interconnect with other utility systems.

The TWE Project will be built in two phases. Initially, the TWE Project will operate at 1,500 MW; the second phase will upgrade the line to operate at 3,000 MW. Western Area Power Administration ("Western") is currently participating in the TWE Project through its Transmission Infrastructure Program pursuant to a Development Agreement between TransWest and Western executed in September 2011. Western and the Bureau of Land Management, Department of the Interior ("BLM") are jointly preparing an Environmental Impact Statement ("EIS") for the TWE Project in compliance with the National Environmental Policy Act. A Draft EIS was published in July 2013, the Final EIS is scheduled to be released in April 2015, and the Record of Decision is scheduled for September 2015.

In 2013, the National Renewable Energy Laboratory, Department of Energy ("NREL") conducted an economic analysis of the costs and benefits of expanding the transmission network to provide California access to Wyoming's wind resources. NREL relied upon publically available data and was supported by a Technical Review Committee made up of experts from California and the region. NREL published a study entitled, California-Wyoming Grid Integration Study, Phase 1 – Economic Analysis,[1] which concludes that the benefits of a high voltage DC line between Wyoming and California's border that provides California access to Wyoming wind significantly exceed the costs of the development. NREL used portfolio information derived from previous versions of the RPS Calculator and compared the projected portfolio based on the RPS Calculator results with a portfolio that substituted Wyoming wind resources for a portion of the portfolio. These results were consistent with the results from the previous WECC 10-Year Plan analysis.[2]

## II. RESPONSES TO STAFF PROPOSAL QUESTIONS[3]

### A. Renewable Net Short Methodology

**1. Energy Division's proposal that projects with CPUC-approved PPAs be automatically included in the policy-preferred portfolio, which is used in the CAISO's TPP, is predicated on the assumption that projects with a CPUC-approved PPA are sufficiently viable for the purpose of long-term generation and transmission planning. If you do not agree with the above assumption, please identify the necessary changes to the RPS procurement process to make the above assumption true.**

Commission-approved power purchase agreements ("PPAs") should be viewed as one indicator of a project's viability for purposes of long-term generation and transmission planning.

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[1] *See* California-Wyoming Grid Integration Study, Phase 1 – Economic Analysis, NREL, March 2014,http://www.nrel.gov/docs/fy14osti/61192.pdf

[2] *See* 10-Year Regional Transmission Plan, Plan Summary, WECC, September 2011, https://www.wecc.biz/Reliability/2011_Plan_Summary.pdf

[3] TransWest does not offer opening comments on each question posed in the Proposal, but reserves the right to comment on all issues in its reply comments or in any subsequent portion of this proceeding. For ease of reference, TransWest preserves the question numbering as it is presented in the Proposal.

They should not, however, be the only consideration when the Energy Division Staff is determining which "commercial projects" to include in the policy-preferred portfolio that the CAISO studies in its TTP. Other considerations could include, but are not limited to, the results of studies done by California's investor-owned utilities ("IOUs"), WECC, and NREL. Energy Division should also consider available information regarding the cost/benefit ratio of each project, including the estimated cost of transmission as well as the ultimate cost of the energy to California consumers.

Specifically, TransWest further recommends that the RPS Calculator be revised to allow for development of policy-preferred portfolios which include projects that do not have a Commission-approved PPA.

**2. Assuming a CPUC-approved PPA is not an appropriate indicator of project viability for purposes of long-term generation and transmission planning, how should the Energy Division staff determine which "commercial projects" to include in the policy-preferred portfolio that the CAISO studies in its TPP?**

As discussed above, a Commission-approved PPA with respect to a particular project should be viewed as only one indicator of viability for purposes of long-term generation and transmission planning. Ultimately, the policy-preferred portfolio and the alternative portfolios should include the "commercial projects" that minimize the net cost of delivered energy to California consumers.

**3. Should a project with a Commission-approved PPA be included in the policy preferred portfolio sent to the CAISO for TPP purposes even if it will trigger the need for a major new transmission project? Why or why not?**

A project with a Commission approved PPA should be included in the policy preferred portfolio sent to the CAISO for TPP purposes even if it will trigger the need for a major new transmission project, *provided* that the project is estimated to contribute positively to the ultimate

cost of the energy to the California consumer (i.e. least-cost/best fit) based upon the available information with respect to the project's overall cost benefit ratio and its required transmission.

4. **Do you agree with the concept of risk-adjusting commercial projects in the RPS Calculator to derive a renewable net short consistent with RPS need authorization approved in the IOUs' annual RPS procurement plans?**

Yes. All commercial projects should be risk assessed based on the development status of the resource and any enabling transmission project. This risk assessment should include an analysis of the project's development risk, permitting status, environmental issues, revenue projections, necessary transmission upgrades, and the likelihood of such transmission upgrades.

5. **Should the generation from generic projects be risk-adjusted to reflect their potential failure?**

Yes. The risks assessment for generic projects should be the same as any other project under development.

6. **Do you agree with the proposal that projects with expiring contracts in the RPS Calculator (Version 6.0) should be treated in the same manner used by the IOUs when developing long-term RPS procurement plans (See D.13-11-024)? If not, how should RPS facilities with expiring contracts be treated in the RPS Calculator? Explain why the same or different approach is preferred.**

Yes. Projects with expiring contracts in the RPS Calculator should be treated in the same manner used by the IOUs when developing long-term RPS procurement plans.

7. **For the purposes of resource ranking and selection, existing RPS projects with expiring contracts are assigned 25% of the capital costs of a new project (assuming some additional capital expenditures would be needed to prolong the economic lifetime of the plant). Is this an appropriate assumption? If not, what methodology should be used to assign costs to RPS projects with expiring contracts in the resource ranking and selection process of the RPS Calculator?**

No, 25% is not an appropriate assumption. Projects with expiring contracts are generally at or near the end of their economic life, meaning the generation equipment would need to be

replaced for any significant contract extension. The cost of "repowering" a project (i.e. replacing outdated equipment with new, modern equipment) is nearly the same as greenfield development because very little of the original project can be reliably reused. Existing projects also have finite permit approvals, and extending a project may require significant new permitting efforts.

Unless the project developer provides data to include in the process, it would be more appropriate to assume that an investment of between 80-90% of the capital costs of a project would be required to extend the useful life of that project.

## B. Renewable Energy Resource Potential and Cost Update

### 9. Do you agree with the methodology taken to expand the original competitive renewable energy zones or CREZs? Is the methodology used for the renewable resource assessment reasonable for generation and transmission planning purposes?

The methodology must be updated to better assess out-of-state resource areas and identify the lowest cost zones. As described below in TransWest's response to Questions 13 and 34, the transmission estimates for the screening process need to be updated using the best available data from the CAISO or other stakeholder-led planning processes (*e.g.*, WECC). The CAISO and/or other transmission entities would only need to develop detailed estimates for the lowest cost options identified in the initial screening.

### 10. Has the methodology taken to expand the original CREZs failed to identify any RPS resources that should be included in the RPS Calculator?

Yes. The out-of-state zones need to be updated, particularly the zones that have been identified in other analyses as being cost effective.

**11. Do you agree that the capital cost, operating costs, and performance assumptions are reasonable for this level of analysis? If not, please specify the inputs and assumptions that you believe need to be revised and provide a rationale.**

The non-transmission data appears reasonable for a screening process. To meet the stated objectives of the RPS Calculator, however, a long term planning process should include a review of these data against other sources. Specifically, the selection analysis should include sensitivity analyses that include a range of data for the main cost drivers. The CAISO's Transmission Economic Assessment Methodology ("TEAM") has a good description of how sensitivity analysis should be applied in transmission planning.[4]

**D. Treatment of Transmission Costs in Version 6.0**

**13. What information should be used to update transmission cost estimates associated with Super CREZs? Provide recommendations on how the Energy Division staff can improve upon its processes for updating the cost estimates for existing and new transmission included in the RPS Calculator.**

Version 6.0 of the RPS Calculator does not include cost estimates for either the existing or planned CAISO-approved policy transmission projects to reach California 33% RPS goals. These costs need to be included in the RPS Calculator to project the rate impacts accurately for these new projects and more accurately reflect the levelized net cost plus transmission of the projects that will be utilizing these transmission assets. It would also be helpful to directly reconcile the project names used in the CAISO Transmission Plan with the specific regions they are associated with.

[4] *See* Transmission Economic Assessment Methodology (TEAM), CASIO, June 2004 http://www.caiso.com/Documents/TransmissionEconomicAssessmentMethodology.pdf

With respect to out-of-state resource areas, WECC's Transmission Expansion Planning Policy Committee ("TEPPC") has developed transmission cost estimates for regional transmission projects and analyzed specific project configurations to assess potential congestion. TEPPC's work is conducted on a biennial basis in an open stakeholder process with participation from the Commission, CAISO, and the California Energy Commission. TEPPC also relies on the same consultants – E3 and Black & Veatch – to research and develop recommended cost estimates for the Committees review and approval. Thus, the transmission cost information from WECC is more up to date and robust than the data contained in Version 6.0 of the RPS Calculator.

For example, the transmission cost estimate included in Version 6.0 of the RPS Calculator to access the central Wyoming CREZ is overstated by a factor of three as compared to the latest available data from WECC. This overstated transmission cost estimate is the single largest difference between the RPS Calculator and the NREL and WECC economic analysis comparing Wyoming wind with California renewable resources.

This difference in the transmission cost estimates between the NREL/WECC analysis and Proposal is based on two unfounded assumptions about the transmission solution to access central Wyoming included in the Proposal.

First, the RPS Calculator assumes that all out-of-state transmission solutions would be a 500 kV single-circuit AC line regardless of length. The support document provided by staff on transmission recognizes that DC technology (*i.e.*, the technology TransWest proposes to use on the TWE Project) may be more cost effective for long distance transmission.[5] However, cost estimates for DC technology were not applied in Version 6.0 of the RPS Calculator. Based on the

[5] *See* RPS CalcV6.0 Transmission, Informational Materials Explaining Updates and Revisions to RPS Calculator, Slide 25 http://www.cpuc.ca.gov/NR/rdonlyres/42BB6DC5-FCF7-450C-AF2E-9B31ED4E90AB/0/Transmission_Costs.pptx

AC project assumption in the RPS Calculator, a cost of $1,690/kw is used for a 725 mile project. This cost is 67% (or $2 billion) more than a DC line of the same length.

Second, Version 6.0 of the RPS Calculator includes a cost estimate for a "Gateway" project[6] to upgrade the existing in-state transmission system. However, both WECC and NREL regional transmission planning analysis performed production cost modeling ("PCM") analysis of the WECC system and found that the transmission lines south of the TWE Project/CAISO interconnection point in southern Nevada did not experience any congestion due to the addition of the Wyoming resources. The lack of congestion found in the PCM analysis suggests that the Gateway project is not needed. The full RA deliverability assumption for all renewable resources appears to be the driver for the Gateway projects as they are referred to as "DNU" or "Delivery Network Upgrades".[7] Transwest's response to Question 16 outlines why this assumption is not valid.

As a result of these two errors in the Proposal, the RPS Calculator overstates the transmission cost estimate for accessing central Wyoming resources by 3 times. Once these transmission cost estimates are corrected, the central Wyoming wind resources will be accurately represented as one of the lower cost resource areas available to California. These corrections can and should be made immediately based on the extensive work already performed on these projects by the WECC TEPPC. The CAISO has not specifically studied these out-of-state transmission solutions, other than through their involvement in TEPPC, and will not study them through the

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[6] *See* Revised RPS Calculator 6.0 Model, "TX inputs" sheet.
[7] *See* RPS CalcV6.0 Transmission, Informational Materials Explaining Updates and Revisions to RPS Calculator, Slide 23 http://www.cpuc.ca.gov/NR/rdonlyres/42BB6DC5-FCF7-450C-AF2E-9B31ED4E90AB/0/Transmission_Costs.pptx

Generation Interconnection Process or until they are accurately represented within the RPS Calculator as a potential low cost resource area.

**15. The WECC Environmental Data Task Force (EDTF) has been collecting environmental data that may be useful for identifying potential new transmission routes. Should this information be considered when estimating costs for major upgrades not identified by the CAISO? If so, how can this be incorporated into the RPS Calculator's transmission cost assumptions?**

No. The EDTF has found that the environmental related costs for transmission are a relatively small percentage of the overall transmission cost, particularly for projects outside of California.[8] Data from WECC should be used for the transmission cost estimates not identified by the CAISO.

**16. The RPS Calculator currently assumes that all new renewable generation must be made fully deliverable. Should the RPS Calculator be capable of evaluating energy-only and/or partially-deliverable projects? If so, how should the resource ranking and selection methodology be adjusted to reflect the impacts of such projects?**

Yes, the RPS Calculator should be capable of evaluating energy-only and partially RA deliverable projects. The Proposal includes important revisions to the RA capacity valuation in the NMV to reflect both the impacts of higher penetrations of non-diverse resources and the RA market position with respect to sufficient system supply over the next decade or more. The lowering of the RA capacity portion of the NMV should also lower the value of building transmission to fully deliver RA capacity from renewable resources.

The CAISO's criteria for full RA deliverability rightfully are far more stringent than the criteria for firm energy-only network transmission (deliverability) service. This more stringent criteria leads to additional transmission costs to provide full RA deliverability that may not be

[8] *See* Environmental Mitigation Costs Study – Final Report for the Western Electricity Coordinating Council, November 3, 2013 https://www.wecc.biz/Reliability/2013_Mitigation_Cost_Study_FinalReport_EDTF.pdf

justifiable within an over-supplied RA market. The CAISO's GIP process allows generators to select what service they desire, which leads the CAISO to apply the appropriate criteria in GIP studies. In instances, where the CAISO has examined potential out-of-state transmission expansion on an economic basis,[9] the CAISO has focused its analysis on utilizing the inherent system RA deliverability (approximately 200 to 400 MW) to derive RA capacity benefits. Although full RA deliverability was not examined in these studies, it is unlikely that the CAISO would have found it economic to upgrade the CAISO network to a full RA deliverability capacity to match the 1,500 MW of capacity of the new lines being considered. These same general economics, where partial RA deliverability is considered to maximize the use of the existing system, are likely to be found for other out-of-state transmission projects.

As outlined in TransWest's response to Question 13, the full deliverability assumption increases the transmission cost estimate to access Wyoming resources in south central Wyoming by assuming "Gateway" transmission expansion is required. In the resource table[10] this erroneous assumption adds almost $50/MWh to these Wyoming resources in a market trading in and around the $100/MWh range.

Accordingly, TransWest suggests that the RPS Calculator should first be populated with transmission cost estimates to provide firm energy-only deliverability along with an estimate of the inherent system RA deliverability, if available, associated with this transmission expansion. The NMV for RA capacity would be based on the partial RA deliverability capacity and the energy-only transmission cost. In cases where full deliverability may provide a better NMV, a

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[9] These projects include the Colorado River – Delaney 500 kV Project and the Eldorado – Harry Allen 500 kV Project. Summaries of these studies are included within the CAISO 2014 Transmission Plan, http://www.caiso.com/Documents/Board-Approved2013-2014TransmissionPlan_July162014.pdf

[10] *See* Revised RPS Calculator 6.0 Model, "Supply Curve" sheet

second transmission cost adder should be included to provide the incremental transmission expansion cost estimates to provide full RA deliverability.

**E. Energy Value**

**17. Is the approach described above to calculating Energy Value using a simplified generation "stack" model appropriate? Are there other methodologies that should be considered that would incorporate saturation effects, such as declining energy value and increased curtailment with higher penetration?**

Yes. The proposed methodology is a significant improvement on earlier versions of the RPS Calculator and should be implemented immediately. Recognition of declining energy value as excess energy is produced during some hours of the day/year by over dependence on particular renewable resources (*e.g.*, solar PV) is critical to effective planning. However, the simplified average-day "stack" model, with its inability to consider all hourly conditions and dispatch limitations on thermal generators, may understate the excess energy produced by additional renewable generation. Therefore, if Version 6.0 of the RPS Calculator is implemented as proposed, detailed production cost modeling should be conducted on a limited number of cases and the results compared to the simplified "stack" model to see if future refinements are warranted.

**18. Is the data used for the resource production profiles granular enough for the purposes of the RPS Calculator? If not, what additional information is needed?**

See response to question 17.

**F. Capacity Value**

**19. Is it appropriate to use ELCC values instead of NQC for planning purposes in the RPS Calculator?**

Yes. The proposed ELCC methodology is a significant improvement on the NQC methodology used in earlier versions of the RPS Calculator and should be implemented

immediately. Recognition of declining capacity value due to increasing market penetration of particular renewable resources (*e.g.*, solar PV) is critical to effective planning.

**20. Is this set of seven resources listed above reasonable for capacity valuation within the context of long-term renewable resource planning?**

No. The two wind types – coastal and inland – may be reasonable proxies for California wind resources but they are not representative of wind resources in the interior states. If the Commission wants to create a level playing field for out-of-state renewables, one or more wind profiles should be developed that are representative of wind resources in the interior states.

**22. Is the proposed approach used to forecast the avoided cost of system capacity appropriate for calculating capacity value? Please provide any recommendations for improving the methodology or alternative assumptions that should be used.**

Yes. The proposed methodology is a significant improvement on the methodology used in earlier versions of the RPS Calculator and should be implemented immediately. The proposed methodology correctly recognizes that capacity from additional renewables has limited value in a market with surplus capacity.

## G. Renewable Integration Costs

**25. In light of the potential for increased renewable penetration beyond 33%, is it important for the RPS Calculator to have an Integration Cost Adder?**

Yes.

**26. Are the costs categories that are proposed to be included in the Integration Cost Adder methodology appropriate?**

Yes.

**27. The discussion above in the Renewable Integration Costs section identifies a number of effects of renewable generation on system operations that could be included in a renewable integration cost adder, all of which result from limitations on the flexibility of the power system and the need to carry additional operating reserves. What methodology should Energy Division staff use to evaluate these costs?**

This would be a challenging analysis because the RPS Calculator looks at specific resources but flexibility is an overall portfolio requirement.

It may be possible to analyze a limited number of portfolios using a model such as E3's REFLEX Model,[11] and use those results to estimate integration costs for different classes of resources (*e.g.*, solar PV, California coastal wind, California inland wind, interior state wind). If such an analysis is undertaken, it would be important to include interior state wind in some of the portfolios to assess the significant diversity benefits of this resource.

**29. Allowing for economic curtailment of renewable generation can provide additional operational flexibility on a system seeking to integrate high penetrations of renewable generation by providing operators with a tool to control "net load" (load minus renewable generation). Should the RPS Calculator consider using renewable curtailment as the "default" solution to power system flexibility limitations for the purpose of renewable resource planning? If not, explain why not and whether an alternative approach should be used?**

Yes. While more cost effective solutions may emerge over time, curtailment is an appropriate "default" solution at this point in the analysis.

[11] *See* Renewable Energy Flexibility (REFLEX) Model, Energy +Environmental Economics https://ethree.com/public_projects/reflex.php

**30. Are there any additional system costs imposed by higher penetrations of renewable resources that are not included in the table above?**

The table correctly identifies the major cost categories. However, it should be recognized that flexibility is an overall portfolio requirement and diversity (of resource types and locations) within the portfolio is an important tool for reducing flexibility requirements and costs.

## H. Treatment of Small Utility-Scale Resources

**31. Identified above are five categories of direct incremental value that small utility-scale renewable projects located close to load might provide (relative to large-scale renewable resources). Are there any additional ratepayer realized values that should be considered? If so, please describe how that value can be quantified in the RPS Calculator.**

No.

## I. Aligning Generation and Transmission Planning with Renewable Procurement

**35. What modifications, if any, are necessary to the generation and transmission planning and procurement processes to ensure that in-state and out-of-state renewable resources, and associated transmission, are selected in a manner that minimizes net costs of delivered renewable energy while ensuring system reliability? What role should the RPS Calculator have in this process, if any, or is another process needed?**

The LTPP and TPP processes need to be modified to: (1) allow for non-GIP eligible out-of-state resource areas to be analyzed and considered by the CAISO within the TPP; and (2) use such results to update the RPS Calculator. Initially, Version 6.0 of the RPS Calculator should use the most current transmission data available. In the case of out-of-state renewable resources, WECC's TEPPC has been the leader in refining and analyzing transmission data associated with out of state renewable resources.[12] The transmission data for out-of-state resource areas should be

[12] The TEPPC website includes Transmission Plans and Data Sets, including a revised and updated generation and transmission cost data sets. *See* https://www.wecc.biz/TransmissionExpansionPlanning/Pages/Default.aspx

updated as part of the planned transmission cost estimate updates planned to be completed by the first quarter of 2015.

The next step in the transmission planning process is to have the CAISO analyze the lowest cost resource areas as part of the "special studies" planned in Track 1 of this proceeding, which should include the central Wyoming resource area and DC transmission line. These CAISO studies should utilize the TEAM to examine the overall benefits from accessing this resource area compared to the costs for access. The results from this CAISO analysis should then be used to update version 6.1 of the RPS Calculator for Track 2.

**36. What implementation issues or challenges, if any, do you foresee in the use of Version 6.0 of the RPS Calculator to inform planning in the CPUC's LTPP and CAISO's TPP?**

It is critical that the transmission data be updated prior to the use of Version 6.0 of the RPS Calculator in the LTPP and TPP. Currently, Version 6.0 of the RPS Calculator does not include cost estimates for either the existing or the planned CAISO approved policy transmission projects to reach the 33% RPS goal. Moreover, Version 6.0 of the RPS Calculator does not include updated transmission data for the potential regional transmission projects that have been considered in other transmission planning processes. To meet the stated objectives of finding the lowest cost portfolios and identifying needed transmission, the transmission data in the RPS Calculator needs to be updated on a more regular basis.

Additionally, the RPS Calculator includes a significant amount of outdated data on potential resources. These potential resources are almost ten times the amount of resources needed within the planning horizon. This significant amount of resource information and the wide breadth of analysis conducted in the RPS Calculator significantly limits the ability for the LTPP or TPP to adequately perform sensitivity analysis that would analyze a range of potential data values

for the lowest cost resources. The lack of sensitivity analysis included in the RPS Calculator limits the ability to consider potential impacts from changes in how the system is used and analyzed.

Dated: December 3, 2014

Respectfully submitted,

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**VERIFICATION**

I, Roxane J. Perruso, am the Vice President and General Counsel for TransWest Express LLC. I am authorized to make this Verification on its behalf. I have read the foregoing OPENING COMMENTS OF TRANSWEST EXPRESS LLC ON ENERGY DIVISION STAFF PROPOSAL ON THE RPS CALCULATOR. I am informed and believe that the matters stated in the foregoing pleading are true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on December 3, 2014 at Denver, Colorado

/s/ *Roxane J. Perruso*

Roxane J. Perruso